

ANSI B11.25–2015

American National Standard for Machines –

Safety Requirements for Large Machines

Secretariat and Accredited Standards Developer:
B11 Standards, Inc.
POB 690905
Houston, TX 77269

Approved: **7 APRIL 2015**

by the
American National Standards Institute



COPYRIGHT PROTECTED DOCUMENT

Copyright © 2015 by B11 Standards, Inc.

All rights reserved. Printed in the United States of America

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of B11 Standards, Inc.

AMERICAN NATIONAL STANDARDS

By approving this American National Standard, the ANSI Board of Standards Review confirms that the requirements for due process, consensus, balance and openness have been met by B11 Standards, Inc. (the ANSI-accredited standards developing organization).

American National Standards are developed through a consensus process. Consensus is established when substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward resolution. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While B11 Standards, Inc. administers the process and establishes procedures to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards or guidelines.

American National Standards are promulgated through ANSI for voluntary use; their existence does not in any respect preclude anyone, whether they have approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards. However, users, distributors, regulatory bodies, certification agencies and others concerned may apply American National Standards as mandatory requirements in commerce and industry.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of an American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the Secretariat (B11 Standards, Inc.).

B11 STANDARDS, INC. MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED AS TO THE FITNESS OF MERCHANTABILITY OR ACCURACY OF THE INFORMATION CONTAINED WITHIN THIS STANDARD, AND DISCLAIMS AND MAKES NO WARRANTY THAT THE INFORMATION IN THIS DOCUMENT WILL FULFILL ANY OF YOUR PARTICULAR PURPOSES OR NEEDS. B11 STANDARDS, INC. DISCLAIMS LIABILITY FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE WHATSOEVER, WHETHER SPECIAL, INDIRECT, CONSEQUENTIAL OR COMPENSATORY, DIRECTLY OR INDIRECTLY RESULTING FROM THE PUBLICATION, USE OF, APPLICATION OR RELIANCE ON THIS DOCUMENT. B11 STANDARDS, INC. DOES NOT UNDERTAKE TO GUARANTEE THE PERFORMANCE OF ANY INDIVIDUAL MANUFACTURER OR SELLER'S PRODUCTS OR SERVICES BY VIRTUE OF THIS STANDARD OR GUIDE, NOR DOES IT TAKE ANY POSITION WITH RESPECT TO THE VALIDITY OF ANY PATENT RIGHTS ASSERTED IN CONNECTION WITH THE ITEMS WHICH ARE MENTIONED IN OR ARE THE SUBJECT OF THIS DOCUMENT, AND B11 STANDARDS, INC. DISCLAIMS LIABILITY FOR THE INFRINGEMENT OF ANY PATENT RESULTING FROM THE USE OF OR RELIANCE ON THIS DOCUMENT. USERS OF THIS DOCUMENT ARE EXPRESSLY ADVISED THAT DETERMINATION OF THE VALIDITY OF ANY SUCH PATENT RIGHTS, AND THE RISK OF INFRINGEMENT OF SUCH RIGHTS, IS ENTIRELY THEIR OWN RESPONSIBILITY.

In publishing or making this document available, B11 Standards, Inc. is not undertaking to render professional or other services for or on behalf of any person or entity, nor is B11 Standards, Inc. undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment, or as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

B11 Standards, Inc. has no power, nor does it undertake to police or enforce conformance to the requirements of this document. B11 Standards, Inc. does not certify, test or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of conformance to any health or safety-related information in this document shall not be attributable to B11 Standards, Inc. and is solely the responsibility of the certifier or maker of the statement.

NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. You may contact the Secretariat for current status information on this, or other B11 standards.

Published by: B11 Standards, Inc., POB 690905, Houston, TX 77269-0905, USA
Copyright © 2015 by B11 Standards, Inc.
All rights reserved. Printed in the United States of America

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Table of Contents

Page

Contents

FOREWORD	V
INTRODUCTION	IX
1 SCOPE	10
1.1 EXCLUSIONS	10
2 NORMATIVE REFERENCES	11
3 DEFINITIONS	13
4 RESPONSIBILITY	13
4.1 SUPPLIER RESPONSIBILITIES	13
4.2 USER RESPONSIBILITIES	14
4.3 MODIFIER RESPONSIBILITIES	14
4.4 PERSONNEL RESPONSIBILITIES	14
5 RISK ASSESSMENT PROCESS	14
5.1 GENERAL	14
5.2 TASKS	16
5.3 POTENTIAL HAZARDS	17
5.3.1 <i>Reasonably foreseeable hazards</i>	17
5.3.2 <i>Hazards not associated with tasks</i>	18
6 DESIGN, CONSTRUCTION, RECONSTRUCTION, AND MODIFICATION	19
6.1 GENERAL REQUIREMENTS FOR LARGE MACHINES	19
6.2 RISK REDUCTION MEASURES	20
6.2.1 <i>Hydraulic / pneumatic aspects</i>	20
6.2.2 <i>Troubleshooting, set-up or maintenance</i>	21
6.2.3 <i>Entrapment</i>	21
6.2.4 <i>Tripping hazards</i>	21
6.2.5 <i>Lighting</i>	22
6.2.6 <i>Concurrent tool changes</i>	22
6.2.7 <i>Stopping time / distance</i>	22
6.2.8 <i>Part transfer</i>	22
6.2.9 <i>Moving work station</i>	22
6.3 LADDERS, WORK PLATFORMS, AND WALKWAYS	22
6.4 ENTERING THE WORKING ENVELOPE	24
6.5 TOTALLY ENCLOSED LARGE MACHINES	25
6.5.1 <i>Risk reduction measures</i>	25
6.6 LAYOUT DESIGN REQUIREMENTS	25
6.7 ELECTRICAL EQUIPMENT REQUIREMENTS	26
6.7.1 <i>Grounding and shielding</i>	26
6.7.2 <i>Interferences</i>	26
6.7.3 <i>Fluctuation or interruption of power sources</i>	26
6.8 MODES OF OPERATION	26
6.8.1 <i>Automatic mode(s)</i>	26
6.8.2 <i>Manual mode(s)</i>	27
6.8.3 <i>Mode design</i>	27
6.8.4 <i>Mode selection</i>	27
6.8.5 <i>Process observation</i>	28
6.9 LOCAL CONTROL	28

6.10	ISOLATION OF POWER SOURCES	29
6.11	STORED ENERGY.....	29
6.12	CONTROL OF GRAVITY INDUCED MOTION	30
6.13	EMERGENCY MOVEMENT.....	30
6.14	PERFORMANCE OF THE SAFETY–RELATED PARTS OF THE CONTROL SYSTEM.....	30
6.15	CONTROL SYSTEM RESET	30
6.16	SYSTEM STARTING/RESTARTING.....	31
6.17	EMERGENCY STOP	31
6.17.1	<i>Emergency stop function</i>	31
6.17.2	<i>Emergency stop devices</i>	32
6.17.3	<i>Recovery from emergency stop</i>	32
6.18	FLUID IMPACT ON OPERATING ENVIRONMENT AND EQUIPMENT	32
6.18.1	<i>Slip hazard</i>	32
6.19	MECHANICAL EQUIPMENT REQUIREMENTS.....	33
6.19.1	<i>Power transmission components</i>	33
6.19.2	<i>Powered moving parts</i>	33
6.19.3	<i>Broken or falling machine components or equipment</i>	33
6.19.4	<i>Contact with high-temperature surfaces or components</i>	33
6.19.5	<i>Contact with sharp edges, corners, and projections</i>	33
6.20	SAFEGUARDING DESIGN REQUIREMENTS	34
6.21	EJECTED PARTS OR FLUIDS	34
6.22	VIEWING PANELS/WINDOWS	35
6.23	STRUCTURAL INTEGRITY	35
6.24	NOISE	35
6.25	ERGONOMIC CONSIDERATIONS	36
6.26	LOCATION OF AWARENESS DEVICES	36
6.27	ERRORS OF FITTING	36
6.28	MACHINE STABILITY	36
6.29	DOCUMENTATION REQUIREMENTS	36
6.30	REQUIREMENTS FOR REBUILD OR MODIFICATIONS	37
7	LAYOUT, INSTALLATION, TESTING & START-UP.....	38
7.1	LAYOUT.....	38
7.2	LIFTING OF SYSTEM COMPONENTS.....	39
7.3	INSTALLATION.....	40
7.3.1	<i>Installation personnel</i>	40
7.3.2	<i>Transport into and through a facility</i>	41
7.3.3	<i>Floor loading</i>	41
7.3.4	<i>Machine mounting</i>	41
7.3.5	<i>Electrical requirements for installation</i>	41
7.3.6	<i>Isolation of power sources</i>	41
7.3.7	<i>Lighting</i>	42
7.3.8	<i>Lockout / tagout / verify during installation</i>	42
7.4	TESTING AND START-UP	42
8	SAFEGUARDING.....	43
8.1	GENERAL.....	43
8.1.1	<i>Point of operation</i>	43
8.1.2	<i>Unexpected release of energy</i>	43
8.1.3	<i>Moving hazard zone</i>	43
8.1.4	<i>Points of entry</i>	43
8.1.5	<i>Suitability for application</i>	44
8.1.6	<i>Safe distance safeguarding</i>	44
8.1.7	<i>Operator control station location(s)</i>	44
8.1.8	<i>Entrapment</i>	44
8.1.9	<i>Elevation changes</i>	44
8.1.10	<i>Slips and falls</i>	44
8.2	VIEWING PANELS / TRANSPARENT GUARDS	45
8.3	ACTIVATION OF SAFETY CONTROL SYSTEM	45

8.4	OPERATOR LOCATION	46
8.5	PENDANT CONTROL	46
8.6	SUSPENSION OF SAFEGUARD	46
8.7	CLEARING THE MACHINE ENVELOPE	46
8.8	NOISE	46
8.9	FIRE SUPPRESSION / ATMOSPHERE DIFFERENTIALS / CONFINED SPACE	46
8.10	SAFEGUARDING AT THE PERIMETER	47
8.11	SAFETY-RELATED SPAN OF CONTROL	47
8.12	SAFETY-RELATED SYSTEM RESET	47
9	SET-UP, OPERATION AND MAINTENANCE	49
9.1	GENERAL	49
9.2	MACHINE SET-UP PROCEDURES	49
9.3	OPERATION	50
9.4	MAINTENANCE	51
9.4.1	<i>Maintenance procedures</i>	51
9.4.2	<i>Maintenance inspections</i>	52
9.5	SUPERVISION	53
9.6	CONTROL OF HAZARDOUS ENERGY	53
9.6.1	<i>Isolation of power sources</i>	54
9.6.2	<i>Routine servicing and maintenance</i>	54
9.6.3	<i>Non-routine servicing and maintenance</i>	55
9.7	INITIATION OF PRODUCTION OPERATIONS	55
9.8	SAFETY SIGNS	55
9.9	PERSONAL PROTECTIVE EQUIPMENT (PPE)	55
10	TRAINING	56
10.1	GENERAL	56
10.2	TRAINING ELEMENTS	56
10.2.1	<i>Training program(s)</i>	57
10.2.2	<i>Trainer qualifications</i>	58
10.3	OPERATOR TRAINING	59
10.4	MAINTENANCE PERSONNEL TRAINING	59
10.5	SUPERVISOR TRAINING	59
10.6	RETRAINING	60
	ANNEX A – LARGE MACHINES AND OSHA	61
	ANNEX B – GENERAL GUIDELINES FOR OPERATOR TRAINING	62
	ANNEX C – SOME EXAMPLE LARGE MACHINES	65